Missouri Healthcare-Associated Infection Reporting System (MHIRS)

Ventilator-Associated Pneumonia (VAP) Prevention Reporting

A. Introduction

"Pneumonia is the second most common nosocomial infection in the United States and is associated with substantial morbidity and mortality. Patients with mechanically assisted ventilation have a high risk of developing nosocomial pneumonia."[1] "Ventilator-associated pneumonia (VAP) is the leading cause of death among hospital-acquired infections, exceeding the rate of death due to central line infections, severe sepsis, and respiratory tract infections in the non-intubated patient. Hospital mortality of ventilated patients who develop VAP is 46%, compared to 32% for ventilated patients who do not develop VAP."[2]

"Care bundles, in general, are groupings of best practices with respect to a disease process that individually improve care, but when applied together may result in substantially greater improvement. The core elements of the bundle are evidence-based strategies that may prevent or reduce risk of complications. The ventilator bundle is a group of evidence-based practices that, when implemented together for all patients on mechanical ventilation, result in dramatic reductions in the incidence of ventilator-associated pneumonia."[2]

"In mechanically ventilated patients, the semi-recumbent position reduces the frequency and risk for nosocomial pneumonia compared to the supine position. Current literature recommends head of bed (HOB) elevation for mechanically ventilated patients to 45 degrees in order to prevent pneumonia. The degree of HOB elevation should be based on the patient's clinical condition and assessment of risk factors. For patients at high risk of skin breakdown, HOB to 30 degrees may be most appropriate in order to prevent pneumonia and the development of pressure ulcers."[3]

Although an "all or none" approach has been the most successful when applying bundle components, the one component which has the greatest individual impact on preventing VAPs, and is the easiest to track and calculate meaningful rates for, is HOB elevation. Therefore, the State of Missouri will initially require that only elevation of the HOB greater than or equal to 30 degrees be reported in intensive care units (ICUs). Other bundle components and/or process measures may be phased in over time.

B. Definitions

- **Intensive Care Unit:** "A nursing care area that provides intensive observation, diagnosis, and therapeutic procedures for adults and/or children who are critically ill. An ICU excludes nursing areas that provide step-down, intermediate care or telemetry only. Specialty care areas are also excluded. The type of ICU is determined by the kind of patients cared for by the unit. That is, if 80% of patients are of a certain type (e.g., patients with trauma), then that ICU is designated as that type of unit (in this case, trauma ICU). When a unit houses roughly equal populations of medical and surgical patients, it is called a medical/surgical unit."[1] For HOB reporting purposes in MHIRS, ICUs will include coronary, medical, surgical, medical/surgical, and "other" (pediatric and neonatal ICUs are excluded from HOB reporting).

- **Ventilator: "**A device to assist or control respiration continuously, inclusive of the weaning period, through a tracheostomy or by endotracheal intubation.
  Note: Lung expansion devices such as intermittent positive-pressure breathing (IPPB); nasal positive end-expiratory pressure (PEEP); and continuous nasal positive airway pressure (CPAP, hypoCPAP) are not considered ventilators unless delivered via tracheostomy or endotracheal intubation (e.g., ET-CPAP)."[1]

C. Reporting Instructions

1. Surveillance for HOB elevation, 30 degrees or greater, for ventilated patients will be performed weekly in the following ICUs:
- Coronary
- Medical
- Surgical
- Medical/Surgical
- Other ICUs (excludes pediatric and neonatal ICUs)

2. Data collection methods are discussed in detail in Section E below.

3. Reporting to DHSS
- In each ICU, a count will be conducted one day each week to determine the total number of patients on a ventilator, and the total number of patients on a ventilator who are in compliance with HOB elevation 30 degrees or greater.
- This weekly count will be summed into a monthly total and submitted monthly to the DHSS using MHIRS.
- Each ICU's data will be reported separately, except the "Other ICUs", which will be a total of all the ICUs (excluding neonatal and pediatric) that are not designated as Coronary, Medical, Surgical, and Medical/Surgical ICUs .
- Reports must be transmitted to the DHSS, via MHIRS, within 60 days of the end of the reporting month.

4. Optional Tools to Collect Data
Hospitals may use any appropriate method to document HOB observations. The following optional forms may be used to collect the required data:
- MHIRS ICU Daily Worksheet (HOB-1) specific to each ICU
- MHIRS ICU Weekly/Monthly Worksheet (HOB-2) specific to each ICU
- MHIRS "Other ICU" Weekly/Monthly Worksheet (HOB-3) specifically for the "Other ICUs".

D. Protocol

"It is understood that patients might be cared for at different bed angles during different times of the day, and that continuous monitoring of bed angles is impossible. Therefore, to implement this measure, the ventilator patient in the ICU must be monitored at least two (2) times in a 24-hour period to see if the HOB is elevated to 30 degrees or greater. The

observations should coincide with the structure of the ICU shifts and one observation should be made on at least two different shifts within the 24-hour period. It is recommended that there be a minimum of 8 hours between observations. In order to achieve the most valid results, it is suggested that a pre-determined schedule be devised."[3]

1. All patients in a coronary, medical, surgical, medical/surgical, and other unit who meet the definition of an ICU (excluding pediatric and neonatal ICUs), are monitored once each week for HOB elevation and the observation is documented (e.g., optional form HOB-1).

2. A separate Weekly/Monthly Worksheet (e.g., optional forms HOB-2 and HOB-3) should be completed for each ICU surveyed during the month.

3. **Numerator Data** are the total number of patients on a ventilator where the patient's HOB is elevated equal to or greater than 30 degrees (See Section E, 2 below).[3]

4. **Denominator Data** are the total number of observed patients on a ventilator on the selected day (See Section E, 2 below).

Note: Numerator and denominator exclusions:

- Patients less than 18 years of age at the date of ICU admission
- Patients with documentation of contraindication for HOB elevation 30 degrees or greater

E. Process and Instructions for Data Collection and Completion of the Optional MHIRS Forms

1. Method for Selecting the Day of the Week to Collect HOB Elevation Data

- As noted earlier, HOB elevation should be recorded one day a week. It is desirable to assess HOB elevation on a different day each week.[3] The easiest way to do this is to select a sequence of days for each month. Such a four-day sequence is called a random permutation. Selecting a permutation gives you the four data-collection days for that month. **Table 1** displays the days on which monitoring should be done for each month.

- Table 1 is already in random order. To use Table 1, select the row corresponding to the month/year in which you will be doing the monitoring. Hospitals that begin monitoring in November 2007, will use the first row; in December 2007, they will use the second row, which is marked December; etc.

- You will collect data on only four days each month. Once the four days in the permutation have been used for the month, you are finished collecting data for that month, even if there is a week or more left in the month. This means you will not collect data during every single week, but you will have 48 days of data collection during the year.

2. DETERMINING INCLUSION IN THE NUMERATOR AND DENOMINATOR

- "When counting observed patient ventilator days, the patient must be on a ventilator at the time the HOB elevation is monitored."[3]

    - "If the patient has a contraindication to HOB elevation or the observation is unable to be made on one observation, but the patient is on the ventilator for the other observation without contraindication or exclusion, the patient ventilator day **is** counted."[3]

    - "If there is a contraindication for both observations, or observations cannot be made for both observations, the patient ventilator day **is not** counted."[3]

    - All observations are to be recorded. You may use form HOB-1 or any other appropriate method.

- After the second observation has been made for each ICU monitored, add up the total number of "Observation Meets Criteria, Count as '1' in Denominator" and the total number of patients "In Compliance with HOB Elevation, Count as '1' in Numerator" and record this information on the line labeled "Total" on form HOB-1.

- The totals collected on the "ICU Daily Worksheet", form HOB-1, are then transferred to the "ICU Weekly/Monthly Worksheet", form HOB-2.

  NOTE: **See "HOB-1 Example" and "HOB-1 Example Explanations" for examples of how numerator and denominator determinations are made, counted and recorded. These examples should answer any questions you might have regarding whether or not to count a patient in the numerator and/or denominator.**

3. Monthly Reporting

- Once the four weekly totals have been recorded and summed on the optional "ICU Weekly/Monthly Worksheet", form HOB-2, you will have collected the monthly data required to report to the DHSS using MHIRS.

- To aid in summing the data for the "Other ICUs", you may use form HOB-3, "Other ICU Weekly/Monthly Worksheet". HOB-3 contains a table where you can enter the monthly data from HOB-2 for each of the "Other ICUs". You will then have all of the information related to "Other ICUs" needed to enter into MHIRS.

- Numerator = total number of patients on a ventilator with HOB elevation 30 degrees or greater for the month, in a given ICU

- Denominator = total number of observed patients on a ventilator for the month, in a given ICU

[1] Centers for Disease Control and Prevention, National Center for Infectious Diseases, The national healthcare safety network (NHSN) manual patient safety component protocol.; May 24, 2007; downloaded 7/13/07 from http://www.cdc.gov/ncidod/dhqp/pdf/nhsn/NHSN_Manual_Patient_Safety_Protocol052407.pdf

[2]Protecting 5 million lives from harm. Getting started kit: prevent ventilator-associated pneumonia, how to guide. Institute for Healthcare Improvement.

[3] Joint Commission Measure Reserve Library. Specifications Manual for National Hospital Quality Measures-ICU; downloaded 1/24/2007 from http://www.jointcommission.org/PerformanceMeasurement/MeasureReserveLibrary/Spec+Manual+-+ICU.htm?HTTP___JCSEARCH.JCAHO.ORG_CGI_BIN_MSMFIND.EXE?RESMASK=MssResEN.mskhttp%3A//jcsearch.jcaho.org/cgi-bin/MsmFind.exe%3Fhttp%3A//jcsearch.jcaho.org/cgi-bin/MsmFind.exe%3FRESMASK%3DMssResEN.msk